

## CLAIMS

We Claim:

1. A bobbin for use in an electrical machine comprising a bobbin having a slit through a section of the bobbin.

2. A rotor assembly for use in an electrical machine, the assembly comprising:

a bobbin assembly having a split through a section of the bobbin assembly for allowing the bobbin to expand;

an excitation winding wrapped around the bobbin assembly; and

a pole assembly for receiving the bobbin wrapped with the excitation winding.

3. The rotor assembly of claim 2 wherein the pole assembly includes a front pole section and a rear pole, the pole assembly including an integrated hub for receiving the bobbin wrapped with the excitation winding.

4. The rotor assembly of claim 2 wherein the bobbin assembly is a single piece component.

5. The rotor assembly of claim 2 wherein the bobbin assembly comprises a first end cap, a second end cap, and a rigid sleeve having an expandable split, wherein the first and second end caps are attached to the rigid sleeve.

6. The rotor assembly of claim 5 wherein the first end cap has an expandable split, the second end cap has an expandable split.
7. The rotor assembly of claim 6 wherein the expandable splits on the first end cap, second end cap and rigid sleeve are aligned.
8. The rotor assembly of claim 5 wherein the rigid sleeve is made from metal.
9. The rotor assembly of claim 5 wherein the first and second end caps are constructed from a laminated structure.
10. The rotor assembly of claim 5 wherein the first and second end caps are constructed from a polymer.
11. The rotor assembly of claim 2 wherein the pole assembly includes a groove that aligns with the expandable split of the bobbin assembly.
12. The rotor assembly of claim 2 further comprising a shaft that is received in a bore formed in the pole assembly, and a slipring assembly attached to the shaft and in communication with the excitation winding.
13. The rotor assembly of claim 2 wherein the bobbin wrapped with the excitation winding is press fit onto the hub of the pole assembly.

14. The rotor assembly of claim 2 wherein the bobbin assembly is made from steel.

15. The rotor assembly of claim 14 further comprising an insulating layer positioned between the bobbin assembly and the excitation winding.

16. The rotor assembly of claim 2 wherein the bobbin assembly is made from an injection molded polymer.

17. A bobbin assembly for use in an electrical machine, the assembly comprising:

a first end cap;

a second end cap;

a rigid sleeve having an expandable split;

wherein the first end cap and second end cap are attached to the rigid sleeve.

18. The bobbin assembly of claim 17 wherein the bobbin assembly is used in a rotor assembly, the rotor assembly further comprising:

an excitation winding wrapped around the bobbin assembly; and

a pole assembly including a front pole section and a rear pole section, the pole assembly including an integrated hub for receiving the bobbin assembly wrapped with the excitation winding.

19. The bobbin assembly of claim 17 wherein the first end cap has an expandable split and the second end cap has an expandable split.

20. The bobbin assembly of claim 17 wherein the first and second end caps are constructed from a laminated structure.

21. The bobbin assembly of claim 17 wherein the first and second end caps are made from a polymer.

22. The bobbin assembly of claim 17 wherein the rigid sleeve is made of metal.

23. The bobbin assembly of claim 18 wherein the pole assembly includes a groove that aligns with the expandable split of the rigid sleeve.

24. The bobbin assembly of claim 18 wherein the bobbin wrapped with the excitation winding is press fit onto the hub of the pole assembly.

25. A method of constructing a rotor assembly for an electrical machine; the method comprising:

- forming a bobbin assembly having an expandable split through a section of the bobbin assembly;
- wrapping a field coil around the bobbin assembly;
- press fitting the field coil wrapped bobbin assembly onto a pole assembly hub.